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METHOD AND APPARATUS FOR TELECONFERENCING

Field of the Invention

The present invention is directed toward a method and apparatus for teleconferencing.

Background

Video and audio teleconferencing technology is moving toward automated services that do not require an operator to manually connect parties to the conferences. Typically, the teleconferencing service provider allocates one or more personal identification numbers (PINs) to subscribers and connects each subscriber to their intended conference based on the PIN entered by the subscriber, through equipment known as a teleconferencing bridge. A conference usually includes a host who organizes or leads the conference, and a number of guests. The host may often have additional privileges beyond those of the guests, such as, for example, being able to add or remove guests from the conference, and may be distinguished from the guests by having a PIN that is different from the PIN or PINs assigned to the guests.

As the number of subscribers to teleconferencing services increase, most service providers are responding by providing subscribers with PINs ranging from four to twelve digits in length. The shorter the PIN, the fewer variations, and thus the fewer unique available PINs. While in theory, a four digit PIN would allow 10,000 subscribers to each have a unique PIN, in fact the number of subscribers must be considerably lower to maintain an acceptable level of security. For example, if all 10,000 possible PINs were assigned to subscribers, an "eavesdropper" (unauthorized user) would have a 100% probability of being connected to a conference simply by guessing any one of the possible variations. Similarly, if a very large percentage of the possible variations are used as PINs, an unauthorized user would have a fairly substantial chance of guessing one of the variations correctly and being connected to a conference. Thus, in order to maintain security of the system, only a few of the possible PINs may be used as actual PINs.

Therefore, as the number of subscribers increases, one solution generally adopted in the industry is to provide each subscriber with a longer PIN, typically ranging between

seven and 10 digits, and some systems may support PINs up to 16 digits in length. However, while most subscribers may be satisfied with the ease of use of a four or five digit PIN, they may begin to struggle as the PIN increases towards 10 digits or even longer. Furthermore, as the length of the numeric string that the subscriber must enter increases, the probability of mis-keying increases geometrically.

Another option used by some teleconferencing bridges is to require two levels of security, and two PINs per subscriber. For example, one PIN may be used to identify the individual subscriber and the other to identify the particular conference that the subscriber wishes to join. However, this solution is not ideal as the subscriber must still remember and enter two PINs. Even if each of these PINs is only, for example, four digits in length, there is still more difficulty for the subscriber to remember two numbers rather than only one, and the chance of error, either in mis-keying or confusing the two PINs, is still substantial.

Another technology that is currently being developed is "voice-over-IP". Voice-over-IP refers to a communication methodology where voice is transferred over a data network, such as the Internet or a local area network (LAN), as opposed to a traditional voice telephone network. Traditional voice telephone networks are typically "circuit-switched", meaning that for every conversation a dedicated "circuit" is formed between parties, and voice is transmitted over a dedicated channel. By contrast, data networks are typically packet-switched, meaning that data transmitted between parties is broken up into packets, and transmitted across the network in an *ad hoc* fashion, using connections as bandwidth becomes available, with no dedicated connection formed between parties. In these systems a large piece of data, for example a sentence spoken by one party, may be broken up into a number of data packets. Each packet may include, in addition to the actual data bits, address bits that identify the sender and destination, and possibly the "session" (for example, conversation) to which the data belongs. Various protocols have been established that dictate what bits are required in each packet. The packets are transmitted over the network using any connection within the network that happens to have available bandwidth, and are ultimately directed to their identified destination. Network routers are typically provided with software algorithms that determine the most efficient path for each packet over the network. Thus different packets all containing data that belongs to a single session, for example conversation, arrive at the destination via different routes, and may not arrive in the order in which they were transmitted.

Although network devices are typically provided with software to enable them to reassemble the received packets into the proper order, this may take time. While this is typically not a problem for most data transfers, it can create problems in voice communication where long delays (on the order of tenths of seconds) are not acceptable, and where it is critical that the listener receive the voice data in the proper order. Systems are being developed that address these issues to provide acceptable quality voice communication over data networks such as the Internet.

Summary

According to one embodiment, a method of assigning access information for a teleconference to a group of conferees comprises assigning a conference I.D. number to the group of conferees, and dividing the conference I.D. number into a first portion and a second portion. The method includes assigning an input sequence to the group of conferees, the input sequence being derived from the first portion of the conference I.D. number, and assigning a PIN to each conferee of the group of conferees, the PIN being derived from the second portion of the conference I.D. number.

Another embodiment is directed toward a method of allocating available space on a teleconferencing bridge to a group of subscriber units, the method comprising receiving information derived from a telephone number upon which a call from a subscriber unit is received, and receiving a PIN from the subscriber unit. The method further includes deriving, from the PIN and the information derived from the telephone number, a conference I.D. number, validating the conference I.D. number, and allocating the space to the subscriber unit based on a result of validating the conference I.D. number.

Another embodiment is directed toward a computer readable medium encoded with a plurality of instructions for execution on at least one processor. The plurality of instructions performs a method for accessing a teleconference, the method comprising

receiving information derived from an input sequence entered by a subscriber unit, and receiving a PIN from the subscriber unit. The method further comprises deriving, from the PIN and the information derived from the input sequence, a conference I.D. number, and validating the conference I.D. number.

According to another embodiment, a teleconferencing bridge includes at least one programmable device effecting a sequence of instructions comprising receiving information derived from a first string of digits entered by a conferee and receiving a